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Andersen et al.

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[54] **SYSTEM AND METHOD FOR IMPLANTING CARDIAC VALVES**

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FOREIGN PATENT DOCUMENTS

0103546	3/1984	European Pat. Off.	623/2
0103546 A1	3/1984	European Pat. Off.	.
1258406	9/1986	U.S.S.R.	623/2
1271508	11/1986	U.S.S.R.	623/2
2056023	3/1981	United Kingdom	.
9117720	11/1991	WIPO	.
9217118	10/1992	WIPO	.

[21] Appl. No.: **801,036**
[22] Filed: **Feb. 19, 1997**

Related U.S. Application Data

[63] Continuation of Ser. No. 569,314, Dec. 8, 1995, abandoned, which is a continuation of Ser. No. 352,127, Dec. 1, 1994, abandoned, which is a division of Ser. No. 261,235, Jun. 14, 1994, Pat. No. 5,411,552, which is a continuation of Ser. No. 961,891, filed as PCT/DK91/00134 May 16, 1991 published as WO91/17720 Nov. 28, 1991, abandoned.

[30] **Foreign Application Priority Data**

May 18, 1990 [DK] Denmark 1246/90

[51] **Int. Cl.⁶** **A61F 2/24**

[52] **U.S. Cl.** **623/2; 606/108**

[58] **Field of Search** **623/2, 900; 606/108; 600/36**

[56] **References Cited**

U.S. PATENT DOCUMENTS

Re. 33,258	7/1990	Onik .	
3,409,013	11/1968	Berry .	
3,587,115	6/1971	Shiley .	
3,671,979	6/1972	Moulopoulos	623/2
3,755,823	9/1973	Hancock .	
4,056,854	11/1977	Boretos et al.	623/2
4,106,129	8/1978	Carpentier et al.	
4,222,126	9/1980	Boretos et al.	
4,574,803	3/1986	Starz .	
4,580,568	4/1986	Gianturco .	
4,592,340	6/1986	Boyles	623/2
4,612,011	9/1986	Kautzky .	

(List continued on next page.)

8 Claims, 4 Drawing Sheets

Sixteenth Edition of *The Merck Manual of Diagnosis and Therapy* (1992) "Valvular Heart Disease," p. 546-553.
Yamaguchi, Case Description, "A Case of a Reoperation using a Balloon Catheter with blocked Pars Ascendes Aortae," *Kyobu Geka*, Oct. 1989, 42:11, pp. 961-964.
World Medical Manufacturing Corporation, Talent Endovascular Bifurcated Spring Graft System Composite Design brochure, no date.

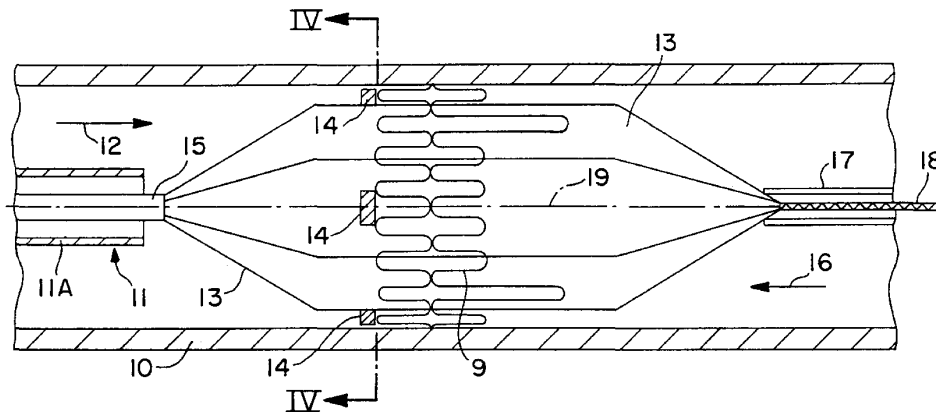
Primary Examiner—David H. Willse
Attorney, Agent, or Firm—Jeffrey J. Grainger; Jens E. Hoekendijk; Michael J. Lynch

[57] **ABSTRACT**

A valve prosthesis (9) for implantation in the body by use of catheter (11) comprises a stent made from an expandable cylinder-shaped thread structure (2,3) comprising several spaced apices (4). The elastically collapsible valve (4) is mounted on the stent as the commissural points (5) of the valve (6) are secured to the projecting apices (4).

The valve prosthesis (9) can be compressed around the balloon means (13) of the balloon catheter (11) and be inserted in a channel, for instance in the aorta (10). When the valve prosthesis is placed correctly the balloon means (13) is inflated thereby expanding the stent and wedging it against the wall of aorta. The balloon means is provided with beads (14) to ensure a steady fastening of the valve prosthesis on the balloon means during insertion and expansion.

The valve prosthesis (9) and the balloon catheter (11) make it possible to insert a cardiac valve prosthesis without a surgical operation comprising opening the thoracic cavity.



U.S. PATENT DOCUMENTS

4,631,052	12/1986	Kensey .	5,032,128	7/1991	Alonso .
4,733,665	3/1988	Palmaz	5,047,041	9/1991	Samuels .
		606/108	5,080,660	1/1992	Buelna .
4,777,951	10/1988	Cribier et al. .	5,089,015	2/1992	Ross .
4,787,899	11/1988	Lazarus .	5,152,771	10/1992	Sabbaghian et al. .
4,787,901	11/1988	Baykut .	5,163,953	11/1992	Vince .
4,796,629	1/1989	Grayzel .	5,167,628	12/1992	Boyles .
4,878,495	11/1989	Grayzel .	5,295,958	3/1994	Shturman .
4,883,458	11/1989	Shiber .	5,332,402	7/1994	Teitelbaum .
4,966,604	10/1990	Reiss .	5,397,351	3/1995	Pavcnik et al. .
4,979,939	12/1990	Shiber .	5,411,552	5/1995	Andersen et al. .
4,986,830	1/1991	Owens et al. .	5,443,446	8/1995	Shturman .
4,994,077	2/1991	Dobben	5,480,424	1/1996	Cox .
		623/2	5,545,209	8/1996	Roberts et al. .
5,007,896	4/1991	Shiber .	5,593,405	1/1997	Osyпка .
5,011,488	4/1991	Ginsburg .			
5,026,366	6/1991	Leckrone .			

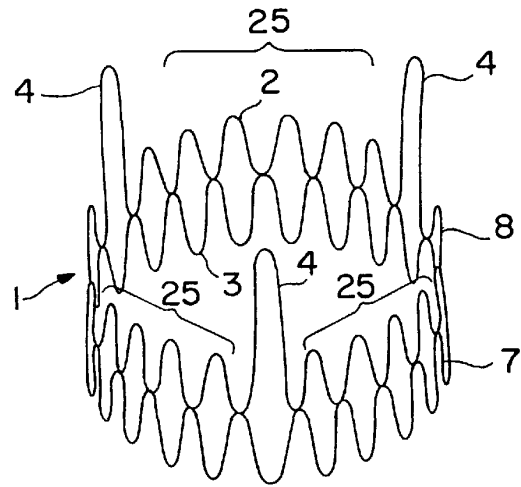


FIG. 1

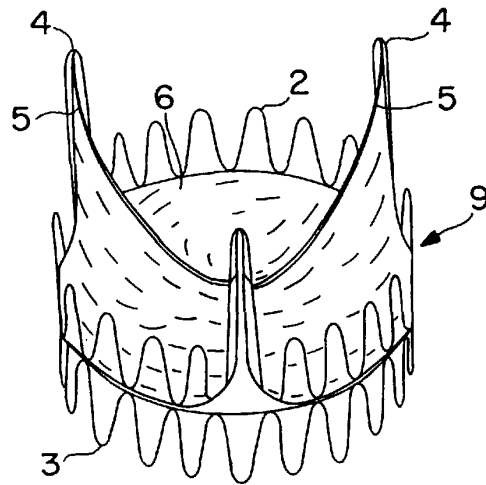


FIG. 2

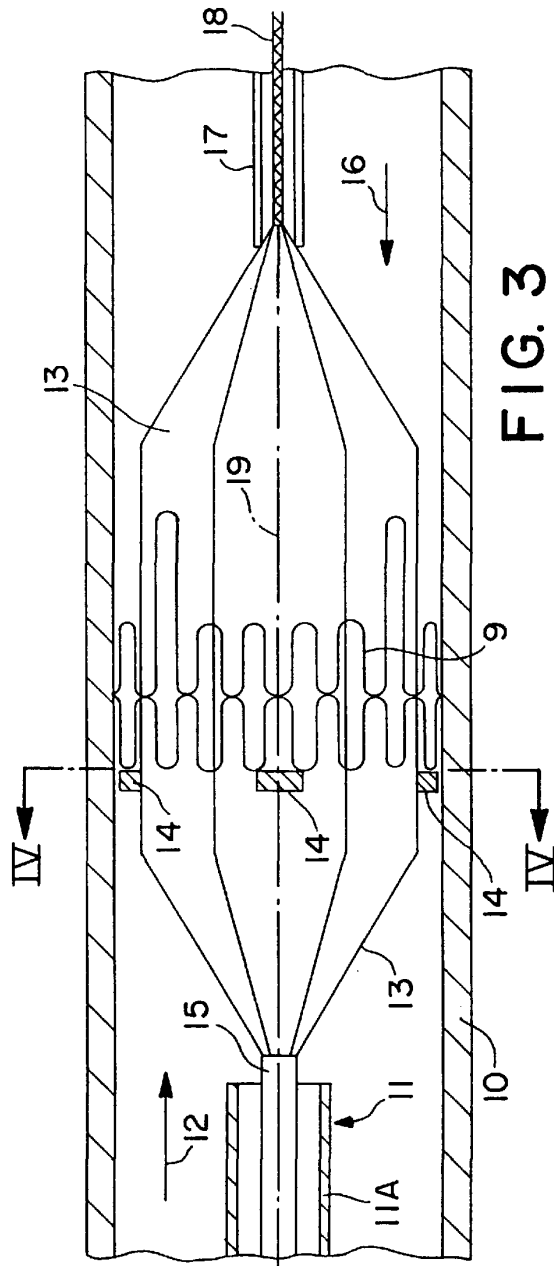


FIG. 3

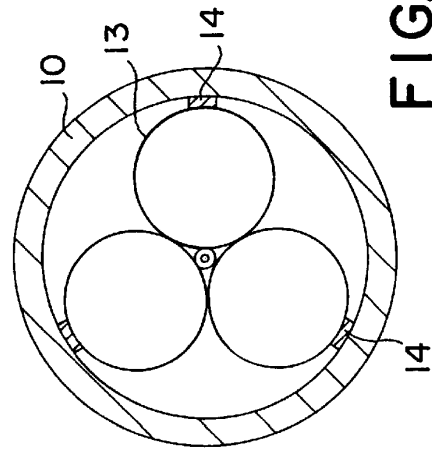


FIG. 4

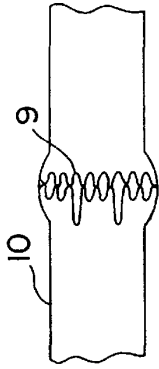


FIG. 5

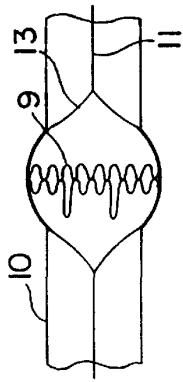


FIG. 6

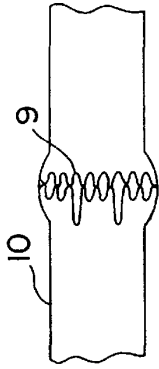


FIG. 7

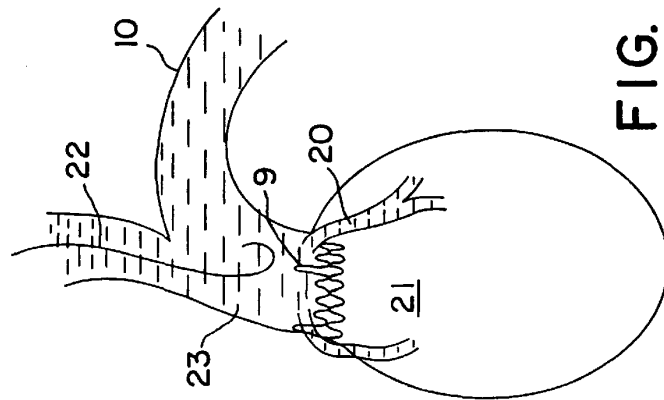


FIG. 8

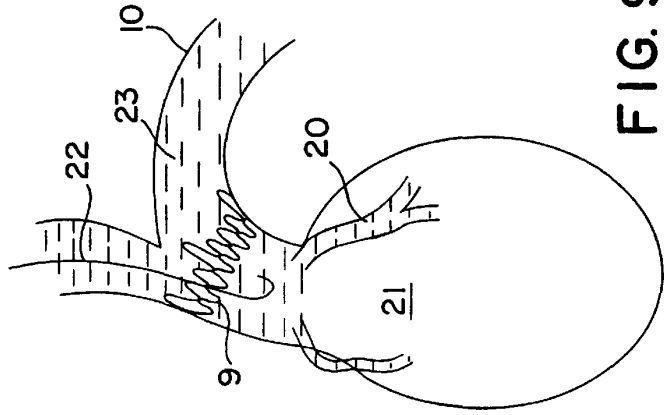


FIG. 9

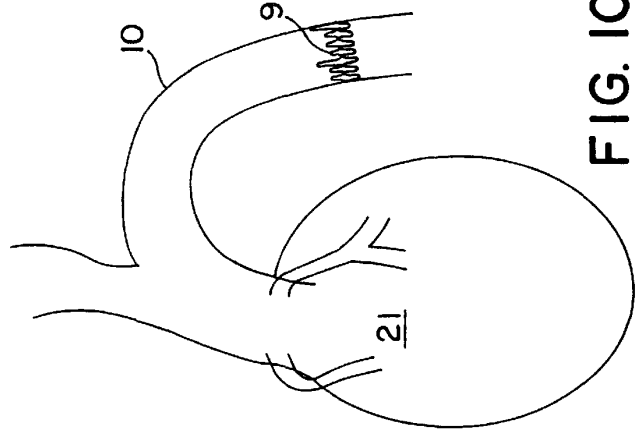


FIG. 10

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